Vol. III. July, 1937 No. 7.

# DISEASES OF THE CHEST

Official Organ of the Amer. College of Chest Physicians
Editorial offices 1018 Mills Building, El Paso, Texas
Business Address Myrtle at Virginia, El Paso, Texas

(A MONTHLY PUBLICATION)

Subscription: United States and Canada $2.00 per year. Other countries $2.50 per year.
Entered as second-class matter August 18, 1936, at the post office at El Paso, Texas, under the Act of August 24, 1912.

*"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."*

*Lawrason Brown, M. D.*

## Editorial Comment

**The New Editor-in-Chief**

AT THE recent meeting of the American College of Chest Specialists Dr. Frank Walton Burge was elected chairman of the Editorial Board of Diseases of the Chest. The other members elected were Dr. Champneys H. Holmes of Atlanta, Ga., and Dr. Charles M. Hendricks, El Paso, Texas.

Dr. Burge is unusually well-qualified because of his intense interest in Diseases of the Chest. He was born November 17, 1893 in Philadelphia, Pa. Graduated from the University of Pennsylvania in 1917 in Medicine. Dr. Burge served in the Medical Corps of the United States Army during the World War being discharged with rank of Captain.

He was previously instructor of Medicine, University of Pennsylvania, as well as assistant visiting chief, Medical Wards, Philadelphia General Hospital, and Visiting Physician, Rush Hospital for Consumptives, Philadelphia.

At present he is Clinic Chief, Division of Tuberculosis, Department of Public Health, Philadelphia; Associate in Medicine, Graduate School University of Pennsylvania; and Associate Editor for Diseases of the Chest, Cyclopedia of Medicine.

The Editorial Board of Diseases of the Chest is happy to have Dr. Burge take over the duties of Editor in Chief. It is the hope of the Board that Diseases of the Chest will improve with each issue and that it will gradually conform to the wishes and desires of the members of the American College of Chest Specialists. The Editorial Board at all times welcomes suggestions and constructive criticisms that will be helpful in making this journal of greater service.

C. M. H.

**A Tribute to the Retiring Editor-in-Chief**

CHARLES M. HENDRICKS, M.D., El Paso, Texas, Retiring Editor-in-Chief of DISEASES OF THE CHEST, will remain on the Editorial Board. His guidance of policy and general conduct of his office have been so excellent throughout his tenure that it is the hope of the Editorial Board that the change will be only a little vacation, a temporary let up in the amount of work required of him. The deepest gratitude of the AMERICAN COLLEGE OF CHEST PHYSICIANS is universally felt for the splendid pioneer work of Doctor Hendricks in building up "DISEASES OF THE CHEST."

F. W. B.

**Important Notice**

AT THE annual meeting of the Federation of American Sanatoria, held at Atlantic City on June 7th; a motion was introduced and unanimously passed to change the present name of the society to the AMERICAN COLLEGE OF CHEST PHYSICIANS.

For more than a year, the Committee on Membership, has conducted a careful study, concerning the selection of a new name for the society; and the opinions of the members in thirty eight states and the District of Columbia have been canvassed.

The aims and purposes of the society will remain intact, but the new name is more fitting to the high calibre of membership represented by the society. It will serve to raise the present standards for the scientific treatment of chest diseases. The educational policy adopted by the society will be carried forward with greater vigor.

The Editorial Board of DISEASES OF THE CHEST is pleased to make this change, and from this issue on, the journal will be published as the official organ of the AMERICAN COLLEGE OF CHEST PHYSICIANS. Congratulations and Best Wishes.

F. W. B.

**Our New President**

THE AMERICAN COLLEGE of Chest Specialists salutes its second president, Dr. E. W. Hayes of Monrovia, Cal.

Dr. Hayes is well-known for his outstanding work in chest diseases, and has always allied himself with worth-while movements that would tend to further the interest of his chosen specialty.

Dr. Hayes was born July 4, 1883, in Millville, Minnesota. He received his B. S. degree in Carleton College, Minnesota, and in 1913 was graduated in Medicine from the University of Minnesota. He is a fellow of the American College of Physicians. In 1918 Dr. Hayes was a patient at Saranac Lake. After his recovery he took special training in diseases of the chest.

Dr. Hayes has practiced medicine in Monrovia, Cal., for the past 15 years. He is chief of service of Division of Chest Diseases, Orange County Hospital, and is associate professor of medicine, School of Medical Evangelists, Los Angeles, Cal.

Dr. Hayes succeeds Dr. Wm. Devitt who served as president of our organization the first two years of its existence, having been unanimously elected to succeed himself at the Kansas City meeting in 1936.

The American College of Chest Specialists owes a deep debt of gratitude for his earnest and successful administration of the affairs of this new medical organization. We shall ever look to him for counsel and advice.

Dr. Hayes will no doubt continue the policies laid down by our first president and we predict for him a most successful administration.

C. M. H.

**Our President-Elect**

DR. CHAMP H. HOLMES of Atlanta, Georgia, was elected as the President-elect of the AMERICAN COLLEGE OF CHEST PHYSICIANS, at the annual meeting of the society, held on June 7th, at Atlantic City, New Jersey.

Dr. Holmes was born at Macon, Georgia, in 1894. He was educated in the Public Schools of Macon and received his B. S. degree in 1915 from the University of Georgia. In 1919, he was graduated in medicine from the John Hopkins Medical School. He received his training in diseases of the chest at Bellevue Hospital under Dr. James Alexander Miller, and for the past 14 years, has been engaged in the practice of chest diseases at Atlanta, Georgia.

Dr. Holmes was a charter member of the Federation of American Sanatoria, which is now the AMERICAN COLLEGE OF CHEST PHYSICIANS, and he has served as a member of the Editorial Board of DISEASES OF THE CHEST since the inception of the journal. He has been active on numerous committees of the association, and his elevation to the President-elect of the AMERICAN COLLEGE OF CHEST PHYSICIANS is a fitting tribute to our colleague from the State of Georgia.

C. M. H.

**National Tuberculosis Association and American Sanitarium Association**

THE NATIONAL TUBERCULOSIS ASSOCIATION AND AMERICAN SANITARIUM ASSOCIATION held their annual meeting in Milwaukee, Wisconsin, May 31st to June 3rd, 1937.

DR. JAY ARTHUR MYERS was elected President of the National Association. His election was acclaimed by not only the National, but by all other organizations interested in the tuberculosis problem.

DR. JAY ARTHUR MYERS' paper before the American Sanatorium Association, "Tuberculous Pulmonary Infection in Hospital Personnel," should be read by every member of every hospital Staff.

DR. MYERS is doing important work on the Membership Committee of the AMERICAN COLLEGE OF CHEST PHYSICIANS, and has helped maintain their high standard for membership. He also contributed to the work of our Statistical Committee.

In addition to his other activities, DR. MYERS is an author of pulmonary diseases for the CYCLOPEDIA OF MEDICINE published by F. A. Davis Company.

F. W. B.

**Meeting of Thoracic Surgeons**

THE American Association for Thoracic Surgery held their annual meeting at Saranac Lake, New York, on May 31st, June 1st and 2nd.

Dr. Stuart W. Harrington, of the Mayo Clinic at Rochester, Minnesota, was elected as the President of the association for the coming year. He was the Vice-President of the association last year.

Other officers elected were, Dr. Harold Brunn, San Francisco, Vice-President; Dr. Richard H. Meade, Jr., Philadelphia, Pa., Secretary; Dr. Edward D. Churchill, Boston, Mass., Treasurer; and Dr. Evarts A. Graham, St. Louis, Mo., Editor.

Dr. Leo Eloesser of San Francisco, California, is the retiring President. His Presidential address consisted of a scientific paper, entitled, "Bronchostenotic Cavities and Other Closed Foci of Tuberculous Suppuration in the Lung."

Three of the members were elevated to Honorary Membership for outstanding contributions in the field of Thoracic Surgery. The men who received this recognition are: Dr. Hans Jacobaeus, Stockholm, Sweden, who was the principal guest speaker at the meeting; Dr. Edward W. Archibald of Montreal, Canada; and Dr. Nathan W. Green of New Canaan, Connecticut. This elevates the list of Honorary Membership in the American Association of Thoracic Surgery to 14 chosen during a period of 20 years.

The meeting will be held next year at Atlanta, Georgia. F. W. B.

**No Mystery**

THERE is no longer anything mysterious about tuberculosis. We have known its cause since 1882. We know that it is spread in only one way; from the lungs of one suffering from the disease. The presence of one tuberculous person in a household forebodes the infection of other members of the family, and through them, of their friends and neighbors, their companions in school, and their co-workers in the business world.

Remove that one person before he has infected anyone else and the disease stops right there. Moreover, if he is removed to a sanatorium where he can be treated with the modern weapons of science, he will probably return to the family within a comparitively short time, no longer a menace to himself and others.

Tuberculosis is as simple as that. Boiled down, it is a matter of dollars and cents, because it takes a great deal of money to build hospitals, and to equip and maintain them. However, they are indispensable, and if we wish to eradicate tuberculosis all available beds in the U. S. must be put to use.

It has been said "We know all we need to know in order to bring human tuberculosis under control and make it a minor instead of a major disease. But this knowledge has been incompletely applied."

• • • C. M. H.

## ERRATA

We wish to annnounce that the sentence in Dr. Leonidoff's paper reading: "Oil by rectum will many times answer the same purpose," should read "Ether in oil by rectum will many times answer the same purpose." This appeared on page 15 of the May, 1937 issue in Dr. Leonidoff's paper, HOW TO HANDLE ASTHMIC PATIENTS.

# Economy in the Sanatorium Treatment of Pulmonary Tuberculosis

BY
GEORGE L. STIVERS, M.D.
Ridgewood, N. J.

DURING the past five years the general attitude of the medical profession toward the treatment of pulmonary tuberculosis has changed considerably. This is due primarily to an increased knowledge of the evolution of the disease, and to the more favorable results of present day treatment. One should not be misled, however, into believing that the treatment of tuberculosis is adequate, and that there is no need of further intensive measures to combat the disease. There is much known concerning ways and means of attack, but many of us have found it difficult to persuade people to accept this knowledge.

In most sanatoria the treatment of pulmonary tuberculosis by intensive bed rest with a contented mind has been modified. We grant the benefit of prolonged bed rest in many diseases. In pulmonary tuberculosis, bed rest together with the judicious application of some form of collapse therapy, will return to a normal life many apparently hopeless cases.

In its incipient development, pulmonary tuberculosis should be considered an acute process, and for this reason early corrective treatment should be applied as in other acute diseases. There is in every case an acute onset. If the patient were afforded the benefit of an early diagnosis, together with present day surgical treatment and sanatorium care, there would not be so many incurable patients admitted to sanatoria. Unfortunately, there is prejudice toward chest surgery, and many medical practitioners still cling to old ideas of treatment.

I shall consider for further study the following relevant topics:

1. Duration of hospitalization.
2. Diagnosis of tuberculous and nontuberculous diseases of the chest.
3. Treatment of cases with positive sputum.
4. Care of patients with induced pneumothorax.
5. Expectant treatment of cases with negative sputum.
6. Treatment of old cases with apparently negative sputum.

### *Duration of Hospitalization*

The ultimate aim of sanatorium treatment should be to restore the patient to normal life within a minimum period of time. Any measure that tends to confine the patient for more than a reasonably limited period is needlessly expensive. Within a prescribed time medical and surgical measures should be freely utilized to aid in the recovery of the patient. Patients should not be confined to sanatoria for unlimited periods because of positive sputum, unless they have been afforded the benefit of collapse therapy. Those with proved negative sputum should be discharged from the hospital. Continued confinement for many cases of advanced disease with positive sputum is a necessary procedure, but for others this practice results in establishing a class of indolent patients who lose their desire to get well.

The point in question is illustrated by the following case:

Mr. J. McD., a World War veteran, gave a history of tuberculous disease originating in 1918 with positive sputum and hemoptysis.

For fourteen years he worked as a trained nurse, but at various times after hemoptysis, had to be admitted as a patient to the Veteran's Hospital. He improved with bed rest, and subsequently returned to his occupation until another exacerbation compelled his readmission to the hospital.

X-ray, taken September, 1931, shows an old infiltration of both upper lobes, especially the right, with cavitation. Artificial pneumothorax was successfully instituted, producing a good partial col-

lapse, although a large, round adhesion held the lung to the lateral chest wall. Intrapleural pneumolysis was employed to eliminate this adhesion. Pneumothorax and pneumolysis relieved all pulmonary symptoms and returned a negative sputum. The patient gained weight and showed no further development of disease in the contralateral lung. He returned to work and has remained well.

This case illustrates how a tuberculous disease of fourteen years duration, with frequent activation, was practically brought under control in only ten months by means of pneumothorax and pneumolysis. Consider the saving if surgical measures had been adopted at the start of illness!

### *Diagnosis of Tuberculous and Non-tuberculous Diseases of the Chest*

A hasty diagnosis of pulmonary tuberculosis, by means of the stethoscope alone, is of very little value. The first procedure in diagnosis of diseases of the chest should be a critical analysis of the previous history. Then there should be a collaboration with the x-ray and laboratory findings in order to differentiate between various pathological conditions.

Every sanatorium should have an isolation section, or "pre-diagnostic" ward, for admissions. No case should be classified as tuberculous until x-ray and laboratory examinations confirm the diagnosis. Following this procedure, the case may be assigned to the appropriate section for treatment.

The frequency of non-tuberculous lung involvements is significant. To identify pulmonary abscess, bronchiectasis, malignancy, benign tumors, pneumonoconiosis, and other non-tuberculous diseases of the lung is as important as to recognize pulmonary tuberculosis. These cases should not be admitted to sanatoria devoted to the care of pulmonary tuberculosis.

Cases of bronchiectasis, pneumonoconiosis, or lung abscess, who frequently enter the sanatorium with negative sputum, and whose x-rays show no pronounced indication of tuberculous lung involvement, may, after a few months of conservative treatment, show a positive sputum. Cross infection is always a possibility, although it is at times impossible to prove.

From the administration standpoint one must consider not only the extra cost of care for a non-tuberculous case, but also the need of the bed for some other tuberculous patient.

### *Treatment of Cases With Positive Sputum*

Positive sputum is pathognomonic of active tuberculosis and is highly indicative of cavitation. The treatment of such a case from economic considerations should consist not only in sanatorium care, but also in the employment of surgical measures to close the cavity. In this manner the patient's stay in the sanatorium is limited, diminishing for the community the cost of long—continued care and removing a source of infection from the general public.

This is illustrated by the following case:

N. C. This patient was admitted to the hospital May 1, 1931, acutely ill with pulmonary tuberculosis. Her sputum was positive. She complained of a tight, paroxysmal cough with yellow expectoration amounting to two ounces in twenty-four hours, night sweats, fatigue, loss of twenty pounds in weight, sore throat, and hoarseness.

The first x-ray, taken May 4, 1931, showed an infiltration extending from the hilum, involving the entire central portion of the left lung. The left apex and base appeared to be clear. The right lung showed an interlobar pleurisy. Pneumothorax was considered untimely.

The second x-ray was taken July 29, 1931, almost three months after admission. This showed a decided increase of mottling in the left lung; the infiltration now extended to the base. The left apex was still clear, and the right interlobar pleurisy remained the same. Compression therapy was considered inadvisable.

A third x-ray was taken August 29,

1931, one month after previous spread to the base had been noted. Herein was seen an extension of the mottling into the left upper lobe. The infiltration now involved the entire left lung. The case was discussed at various staff conferences, and artificial pneumothorax was repeatedly deferred, the reason being "That it was a very acute process."

On September 4, 1931, four months after admission, the Chief of Staff, noting the marked extension of disease into the apex of the left lung, decided it was advisable to start pneumothorax at once. The same day, artificial pneumothorax, by the rapid collapse method, was instituted, and 1650 cc. of air was introduced into the left pleural cavity within three days. On September 16, 1931, sputum was negative, expectoration amounted to one half ounce in twenty-four hours, and all symptoms were relieved. The patient was discharged one year later, free of all symptoms, and fifteen pounds heavier. At present she is working and leading a normal life.

The final results in this case in all probability would have been far different if only bed rest had been continued.

The economic question in this case is: Was correct treatment applied at the proper time? If the above case had been given artificial pneumothorax soon after admission, would the number of hospital days have been materially lessened?

Cases with positive sputum that recover without collapse therapy are few, and these usually require many years of sanatorium treatment.

Ineffectual collapse should not be continued indefinitely, as this may result in a unilateral disease developing into a bilateral involvement. In every sanatorium there are numerous patients who have had lung compression for months with persistent positive sputum, yet pneumothorax is continued. There are many cases wherein the effectiveness of pneumothorax therapy is limited by pleuropulmonary adhesions.

The following case shows the need for more active measures in order to produce better results in the treatment of this disease:

Series 126. M. T. Patient was admitted to the hospital on December 3, 1932. Her sputum was positive. During August, 1934, artificial pneumothorax was instituted. Adhesions prevented complete collapse, but pneumothorax was continued until January, 1935. Pneumolysis was then performed and resulted in a satisfactory collapse, negative sputum, and relief of all previous symptoms.

The patient is now ready for discharge after thirty-three months of sanatorium care. This case has cost the city twenty months of unnecessary expense, whereas thirteen months of treatment should have been ample to return this patient to society.

The manifold advantages to be derived from the use of intrapleural pneumolysis in appropriate cases will eventually provide a new chapter in the history of chest surgery.

Our resources are not exhausted by the use of pneumothorax, pneumolysis, or phrenicectomy, for if in certain cases these methods of treatment fail to produce the desired result, more radical surgery should be resorted to.

I believe that the presence of cavitation and positive sputum are more important indications for early thoracoplasty than the presence of fibrotic tissue, in spite of the fact that the latter has been considered a necessity.

There are cases in which collapse of the cavitated apical areas by pneumothorax is incomplete, even though negative sputum is occasionally reported. This type should not occupy for years a bed in a sanatorium in the hope of obtaining a consistently negative sputum. It is far better and less costly for such a patient to submit to a partial thoracoplasty, whereby, after a short period of sanatorium after-care, he may be returned to normal living. I cite the following case:

Series 129. J. C. was admitted to the sanatorium on April 28, 1934, with positive sputum. His x-ray showed cavitation at both apices. The patient took bed rest for ten months before active treat-

ment was instituted. On February 1, 1935, initial pneumothorax was given on the left side, followed on the 26th by intrapleural pneumolysis. This procedure resulted in complete collapse of the left lung. Bilateral pneumothorax was attempted but no free pleural space could be found. There was occasional negative sputum. A partial upper stage thoracoplasty on the right side has now been done.

By ineffectual bed rest treatment, ten months have been wasted.

In the records of sanatoria, many cases of a similar nature would be found. It is my contention that state subsidy should be refused all cases with positive sputum in which no attempt has been made to employ collapse measures during sanatorium stay of one year. Any municipality is willing to spend a reasonable amount of money in caring for its sick if favorable results are forthcoming, but it is justified in objecting to supporting cases untreated for years.

I have in mind a regular boarder who has spent five years at a sanatorium. He was receiving pneumothorax for three years, yet his sputum remained positive and the cavity open. I suggested an upper stage thoracoplasty to which the patient consented. Upon reviewing the case the attending physician remarked, "This is an apical case and will never get any worse; besides, he is somewhat light in the head, so why bother?" After five years in a sanatorium with nothing but bed rest, very few of us would retain normal intellect. The attending physician not only failed to recognize the expense of continued hospitalization but also was prejudiced against surgical measures in the treatment of tuberculosis.

### *Care of Patients With Induced Pneumothorax*

Patients with unilateral disease who have had a satisfactory collapse frequently desire to leave the sanatorium and return at stated intervals for pneumothorax refills. Except in complicated cases, I see no reason to refuse. In fact, I favor their discharge if the sputum has been negative for six months. This procedure gives the advantages of sanatorium care to some other case. Besides, the family of the discharged patient may benefit financially, for the arrested case could engage in light work without being a source of infection to others.

Many phthisiologists question the wisdom of limiting hospitalization, considering the responsibility and subsequent care of pneumothorax cases is a duty that the sanatorium should assume. In any case, the waiting list for admission should be consulted in order to render the maximum benefit to all patients.

### *Expectant Treatment of Cases With Negative Sputum*

Let us consider the minimal case with negative sputum, diagnosed by x-ray on admission to the sanatorium. This type of case usually receives "expectant" rest care. In spite of progressive disease ,this treatment is frequently continued until cavitation or hemorrhage appears. Then collapse therapy is employed.

I recall the case of a female, seventeen years of age, in which progression of the disease for ten months after admission was observed by x-ray, yet artificial pneumothorax was not administered by the attending physician. He considered it an apical case, and was not in favor of artificial pneumothorax at that time, stating that if there were progression of disease downward from the apex of the lung, he would still be against pneumothorax and would favor pneumothorax only if the disease extended from a new focus in the middle lobe. When spread of disease and cavitation in the contralateral lung were actually observed ten months later, measures were begun to collapse the initially diseased lung by rapid pneumothorax and pneumolysis. Complete collapse of the lung was effected and the patient discharged from the sanatorium after six months of treatment.

If intelligent treatment had been applied to arrest the disease when increased pathology was seen, the community would have been saved the expense of one year's hospital care. This case is not a rare one.

We hear much of the person who recovers through rest treatment alone, but little of the many patients who are cured by collapse therapy. Some cases improve on bed rest in the sanatorium and show on the x-ray films apparently rapid clearing. However, after discharge they frequently break down with active disease and cavitation.

*Treatment of Old Cases With Apparently Negative Sputum*

Another question that deserves economic consideration is why a patient with negative sputum should be kept at a sanatorium for one, five, and even fifteen years. Because the sputum test of the patient at some former time was positive and later turned negative is no just reason to extend unduly the time of hospitalization. There may be some other complicating disease which requires medical attention, such as heart or kidney affection.

A "tuberculosis" sanatorium should care for the tuberculous; it should not be a boarding house for the infirm and aged. There are general hospitals for other acute illnesses, and there are home farms and mental institutions responsible for the care of other individuals. A negative sputum for one year or less, together with no x-ray evidence of progressive disease or cavitation, is sufficient reason to discharge a patient as an arrested case. If subsequent quarterly examinations show positive sputum with x-ray evidence of further lung involvement, the patient must be readmitted and surgery adopted in order to close the active lesion.

In the same category are old cases with questionable negative sputum and x-ray evidence of cavitation particularly at the apex of the lung. This type is called by some apical, fibrous, or perhaps obsolete. Whatever the name applied, cavitation usually indicates active disease. If discharged from the sanatorium before being cured, they may become sources of infection for others, a most important consideration. Patients with this diagnosis frequently respond favorably to thoracoplasty. It is only through active surgical measures that such cases can be restored to the community without fear of infection.

In conclusion, a frank appraisal of present methods and objectives in the tuberculosis field is clearly indicated. It is natural that this subject should lead to differences of opinion. Many may consider that my assertions here are expressed too positively. I do not mean to be dogmatic, but my actual experience has led me to the definite conclusion that for economical treatment of pulmonary tuberculosis what is needed is more action.

*Summary*

1. "Tuberculosis" sanatoria should admit only cases of diagnosed pulmonary and extra-pulmonary tuberculosis.

2. Every sanatorium should have a "pre-diagnostic" or observation ward. No treatment should be instituted until a positive diagnosis of chest involvement is made.

3. The present diagnostic methods should eliminate all other cases which require treatment in general hospitals, home farms, and state mental institutions.

4. Rest for diseased lungs is the basis of the modern treatment of pulmonary tuberculosis.

5. In any case with positive sputum, even if cavitation is not demonstrated, the limiting time for conservative bed rest treatment should be three months.

6. Positive sputum and cavitation on admission require immediate collapse therapy together with prolonged bed rest.

7. Old apical tuberculosis with open lesions and intermittent positive and negative sputum should receive some form of collapse treatment.

8. If sputum is negative for six months after artificial pneumothorax and there is satisfactory collapse of the lung, the patient may be discharged from the sanatorium and instructed to return for pneumothorax refills.

9. The maximum time for the employment of any single collapse measure should not exceed one year. If at the end of this period the disease fails to show negative sputum and improvement, some other surgery should be adopted.

# SYMPTOMS of Early Tuberculosis

BY
H. FRANK CARMAN, M.D.
Dallas, Texas

THE IMPORTANCE of the symptoms presented by a patient when he comes for an examination is often overlooked or at least minimized and too little attention paid to his story. Symptoms are produced by the reaction of the body to the presence of disease, and are fundamental in diagnostic procedures. By the time a carefully taken history is completed, the physician should have a fairly good working diagnosis. Unless one is examining many chests he can not be expected to find and interpret many of the earlier pulmonary changes in diseases of the lungs. It takes a great deal of concentrated listening to detect early pulmonary disease; therefore mistakes in this connection can be excused. However, one can never be excused for failing to take a good history and to give the symptoms careful study. Many times it becomes necessary to take a second history, independent of the first. New and helpful information can always be elicited in this way. This may seem a waste of time, but nothing is a waste of time that increases efficiency and decreases error.

The early reaction of the body to the presence of tuberculosis produces a chain of symptoms, which, if properly correlated, makes the examiner suspect tuberculosis before the examination is made. Let us study these symptoms briefly:

1. *Fatigue.* This is an early symptom. The tired feeling is out of proportion to the amount of work done. The individual finds that the work he has been doing regularly tires him, when it formerly did not. Many times he is inclined to blame it on spring fever or laziness. He awakens tired. After being up for a while, he feels better from stimulation. However, by evening he is driving himself to complete the day.

2. *Weakness.* This is actually fatigue in a more pronounced state. There is an actual weakening of the body muscles.

3. *Nervous Instability.* A tuberculous patient becomes very nervous and irritable, and is more prone to worry. A woman has a tendency to weep more readily. This, of course, is more noticeable to other members of the family than to the patient. Many times a diagnosis of a nervous breakdown has been made because of the extreme nervousness present in tuberculosis.

4. *Hoarseness.* It is not unusual to find a patient with early tuberculosis who has a husky voice. This is most noticeable after he has been talking a little too much or after a change in the temperature of the room. It does not necessarily mean that there is a tuberculous laryngitis, but the larynx should always be examined as a matter of routine. The hoarseness in early tuberculosis is usually a nervous reflex.

5. *Insomnia.* The tuberculous patient is prone to have sleepless nights which will in part be responsible for the morning fatigue.

6. *Anorexia.* Very early in tuberculosis the patient will have an indifference to food. This may first be noticed at breakfast. After a small amount of food is taken he will feel that he is completely filled and to take more will sometimes cause nausea or even vomiting. No one appreciates this symptom as the tuberculous patient does.

7. *Indigestion.* In many cases there is a tendency very early to regurgitation of the food, "sour stomach" or gas formation in the intestinal tract. With the rest cure there is a certain amount of intestinal atony with constipation and an exaggeration of the above-mentioned symptoms. The condition is aggravated by the accompanying nervousness.

8. *Loss of Weight.* Naturally, with a loss of appetite and with indigestion the patient will start losing weight. A sudden and unexplained loss of ten pounds or more of weight should be investigated.

9. *Fever.* A tuberculous patient will usually have an afternoon elevation of temperature. The morning temperature is

usually subnormal. It is helpful to have the patient take his temperature every four hours and record it. If this does not give sufficient information, the temperature should be taken every two hours. Not only should the elevation be given consideration, but also the variation between morning and evening. A normal range of temperature is from one to one and a half degrees. Allowance must be made for a premenstrual elevation in women, which may be from seven to ten days before menstruation starts. Hammon says, and correctly, "Tuberculosis is the most usual cause of chronic continuous fever, but it is rarely the cause of chronic unexplained fever."

10. *Tachycardia.* Fast pulse is usually not a symptom but rather a finding. However, many patients complain that the heart beats hard or fast, or at times that it seems to palpitate. A fast pulse is not only a diagnostic help, but also a prognostic aid. The prognosis is to be guarded if the pulse persists up to one hundred or above when the patient is at rest. In fact, the prognosis is better when the pulse is slow and the temperature up than when the pulse is fast and the temperature normal.

11. *Cough.* This is not an early symptom of tuberculosis unless it follows some acute respiratory infection; then it is difficult to tell when the cough from tuberculosis has its beginning. There must be enough involvement to produce bronchial irritation before there is a cough. By the time a cough is well developed, the disease may have advanced considerably. It is first manifested by a clearing of the throat which gradually develops into a real cough. Any cough that persists three or four weeks after an acute respiratory infection is supposed to be over should be investigated.

12. *Expectoration.* This is a still later symptom than cough. It is the sign that there has been lung destruction. It is usually mucous at first and gradually becomes purulent. It may or may not contain bacilli. It is much less likely to be positive for tubercle bacilli at first than later as the disease progresses. If the sputum is examined often enough the organisms will usually be found at some time. However, tuberculosis can not be ruled out because of failure to find bacilli in the sputum. One should not wait for a positive sputum to make a diagnosis. Valuable time is being sacrificed.

13. *Hemoptysis.* This may happen at any stage of the disease. Many have the mistaken idea that a hemorrhage occurs only in advanced tuberculosis. The disease is frequently ushered in by the patient's coughing blood without previous warning. When a patient coughs as much as a teaspoonful of blood or more, his condition should be considered tuberculous until proved otherwise. The mistake is too often made of calling hemoptysis a hemorrhage from the throat and letting it go without thorough investigation. An unoperated throat rarely bleeds.

14. *Pleurisy.* A chronic pleurisy is a warning of pulmonary tuberculosis. Pain between the shoulders complained of so frequently is usually not pleurisy but a muscular condition instead. Pleurisy with effusion is tuberculous probably eighty-five per cent of the time. A patient who has pleurisy with effusion should be given from four to eight months rest cure and observed for a much longer time. The fluid can be aspirated or absorbed and the patient will recover as far as the pleurisy is concerned. There may be no demonstrable tuberculous lesions at this time. Three to twelve months later the patient may have an extensive tuberculous involvement of one or both lungs. The pulmonary lesion may be much longer in making its appearance, even up to five years or more. Tubercle bacilli can rarely be found in the fluid upon microscopic examination, but animal inoculation will usually be positive, this is not always the case.

15. *Night Sweats.* These are not so pronounced in early tuberculosis in adults, although they may be very annoying from the beginning. Children have night sweats very early.

In conclusion, let me say that the above-

(Continued to page 30)

# Bronchiectasis - with description of the Peri Nasal Method of Introduction of Iodized Oil For Diagnosis and Treatment*

BY
NATHAN BLUMBERG, M.D.
Philadelphia, Penn.

PULMONARY DISEASE is divided into two types—the frankly tuberculous and the non-tuberculous. In the latter group there are many types such as chronic bronchitis, emphysema, bronchiectasis, malignancy and atelectasis.

Bronchiectasis is a condition or disease often mistaken for chronic bronchitis, frequently so diagnosed by the general practitioner, and treated with many types of medication for years without any relief. It is the most frequently encountered pulmonary affection, even more common than pulmonary tuberculosis. As a matter of fact a great many individuals who are diagnosed as tuberculous are suffering from a greater or less degree of bronchiectasis.

When an individual coughs for a number of weeks he should not be treated merely with all forms of medication but a complete physical examination should be made beginning at the head, paying particular attention to the rhino-pharyngeal tract and all of the sinuses, and proceeding to a careful examination of the chest. In addition, bacteriological examination of smears from throat and nose and of the sputum should be made. Lastly a Roentgen examination of the head and chest should be made.

Each so called case of subacute or chronic bronchitis is a problem, and has a definite etiology. In order to effect a cure, one must find the underlying cause. Although the majority of authors are of the opinion that upper respiratory disease is the most important factor in the production of bronchiectasis, some state that it is quite possible that disease of the accessory sinuses develops more often in patients suffering from bronchiectasis, on account of the large number of bacteria coughed into the mouth from the bronchi, which have developed a secondary infection. On the other hand, as is well known, bronchiectasis frequently follows broncho-pneumonia, and as this disease is much more likely to occur in individuals suffering from disease of the sinuses than in those with a healthy upper respiratory tract, the possibility of accessory sinus disease being directly or indirectly responsible for bronchiectasis must be considered very seriously. To sum this up, it is better to consider the disease as fundamentally infectious and related and not necessarily in ordered sequence.

The essential lesion in bronchiectasis is an acute ulcerative bronchitis, with destruction of epithelium, muscle, and elastic fibers of the bronchial wall, and with an extension of the destructive process into the surrounding muscle fibers; this is followed by a loss of elasticity and tonicity with a subsequent dilatation. Additional factors which may cause dilatation are increased pressure caused by cough and strain, accumulation of material in the cavity, and sudden traction by normal parts of the lung.

Bronchiectasis is also favored by mechanical obstruction interfering with free drainage of the bronchus. The obstruction may be a foreign body, caseous mediastinal glands, neoplasm, swollen bronchial mucosa. As the process of obstruction proceeds, the lumen of the bronchus becomes surrounded by a wall of granulation tissue in which muscle and elastic tissue are usually absent. This granulation tissue becomes relined by epithelium which is frequently of the modified type. As the granulation tissue becomes fibrosed, simultaneous fibrosis takes place in the adjacent parenchyma of the lung.

*Read before the Post Graduate Institute of the Philadelphia County Medical Society.

The appearance of the bronchi in the early stages of bronchiectasis, before relining with epithelium takes place, is such as to suggest that healing at this stage with actual diminution in size of the bronchi may be promoted by bronchoscopic drainage. When once the bronchi become relined with epithelium, such healing is no longer possible. While fibrosis of the lung usually occurs with bronchiectasis, bronchial dilatation can and does occur long before the newly formed fibrous tissue has begun to contract; therefore, the dilatation cannot be purely the result of the contraction of the fibrous tissue. When a whole lobe is involved in the advanced stage of chronic bronchiectasis, it is valueless as far as the function is concerned; but it may act as the focus of infection from which the nasal accessory sinuses are infected. Drainage from such a lobe is rendered impossible by the presence of innumerable epithelium-lined cavities and dilated bronchi. As a result, in considering the treatment of this type, we much consider radical surgical measures.

Bronchiectasis may be unilateral or bilateral; localized or diffuse, cylindric, saccular, or fusiform. It usually affects the lower lobes and the left more frequently than the right. It may occur in the apices as has been shown by McCrae and Funk [1] and Eli H. Rubin and Harry S. Newman [2] who give a resume of the literature of upper-lobe bronchiectasis and state that in a differential diagnosis of pulmonary disease considerable significance is ascribed to the site of the lesion. Upper-lobe lesions are considered tuberculous unless proved otherwise, while lower lobe lesions are considered nontuberculous unless tubercle bacilli are present in the sputum. They further state that bronchiectasis limited to the upper lobes is not so rare as the scanty notes in the literature would indicate and that we must be on our guard and not overlook this condition.

The disease may be congenital or acquired. W. P. Warner [3], describes congenital bronchiectasis in two forms. Fetal form is usually of the bronchial type and due to some malformation of the lung, the child usually dying in utero and the atelectatic form in which there is an atelectasis of the parenchyma with dilatation of the bronchi resulting in various-sized multilocular cavities. There is some doubt whether these cases are abnormal apart from failure of one lung to expand. It is usually considered under acquired bronchiectasis.

Edward Archibald [4], discusses three types of bronchiectasis: a first group in which the clinical symptoms suggest only an aggravated form of chronic bronchitis with superadded catarrhal infection in which iodized oil filling shows cylindrical form of dilatation without evidence of bronchiectatic abscess and in which the x-ray shows the lung parenchyma to be free of shadow of old, unresolved pneumonia with considerable cough and sputum either mucoid or mucopurulent and no fever. In the third group are those suffering from chronic sepsis, occasional or frequent fever, dyspnea on exertion, frequent cough, abundant foul sputum, clubbed nails, loss of weight, color, energy and inability to work. X-ray shows old unresolved pneumonitis—thickened pleura—iodized oil injection shows cylindrical—fusiform and saccular dilatations frequently wth abscesses. Postural drainage — bronchoscopic aspiration and climatic treatment have been of no avail. In this type of case surgery is indicated. In the second group, between the above two, cylindrical fusiform and saccular dilatation are present. There are no clearly defined abscesses. There are short periods of fever. Some cases show a certain amount of parenchymatous infiltration with fibrosis.

The bacteriology of bronchiectasis is not that of the chronic bronchiectatic lung, but rather that of the bronchopneumonia or other acute respiratory disease which marked the onset of the symptoms. While both pyogenic cocci and fuso-spirochetal organisms may be found in early cases, the most destructive lesions are usually caused by the latter group—that is, the fuso-spirochetal group. D. T. Smith [5] states that spirochetes are the

most common etiologic factor in bronchiectasis. On the other hand John A. Kolmer [6] says that in a large number of specimens examined by him he found that "Streptococcic infections are by all odds the most frequent and important and appear to be the prevailing infection in both early and late cases of purulent bronchitis and bronchiectasis. Staphlococci, pneumococci, various gram-negative diplococci including M. Catarrhalis, diptheroid bacilli, B. pyocyaneous and B. Friedlander are also encountered but streptococci, staphlococci and pneumococci appear to be the most important in relation to the primary infection."

The disease is not only found in adults, but in children and is frequently overlooked in the latter group. In children, many diagnoses are made, but the dilated bronchi are overlooked. In this group, it may follow measles, influenza, whooping cough, and the various forms of bronchitis.

*Symptomatology*

First is a chronic cough persisting over a more or less extended period of time. There is usually a purulent expectoration, although some authors have described a condition known as dry bronchiectasis in which there is no expectoration. The explanation of this is that if air does not enter the alveoli during inspiration, the force of the inspiratory effort is transmitted to the bronchi to which the air has access.

When the expectoration is present, it is usually quite offensive and occurs principally in the morning and on arising. This is accounted for by the change in position, since the patient has been sleeping during the night with very little coughing and without emptying the cavities so that they are full of pus. On his moving, the material is dislodged with subsequent cough and expectoration.

The expectoration in many cases is a very characteristic grayish or grayish brown in color. It is fluid, purulent, with a peculiar, acid, sometimes fetid odor. Placed in a conical glass, it separates into a thick granular layer below, and a thin mucoid intervening layer above, which is capped by a brownish froth. Microscopically, it shows pus cells and often large crystals of fatty acids, sometimes in enormous numbers and arranged in bunches. Haematoidin crystals are present occasionally. Elastic fibers are only found when there is ulceration of the bronchial walls. Loss of weight is frequent due to the fact that the patient cannot eat since he has the offensive odor constantly present, accompanied by fever, night sweats, and weakness. When these symptoms occur, one must be on his guard for a diagnosis of acute pulmonary tuberculosis is often made at this time.

The physical signs are, generally speaking, those of fibrosis of the lower lobes with or without evidence of cavitation and an accompanying bronchitis. The most striking feature of these signs is their protean character. Thus, a child may show dullness, distant breath sounds, and occasional rales at one time, but at another time, following a spell of coughing, may show bronchial breathing with many bubbling and sonorous rales and wheezing.

If the cavity is full, the percussion note is dull, but when the secretion is expelled and the cavity fills with air, the note becomes tympanitic. In many cases, there is some demonstrable impairment of the diaphragmatic function. In some instances, when the fibrosis is not extensive, we may find some lagging of one diaphragm, slight impairment of the percussion note, prolongation of expiration, and some moist rales.

Definite clubbing of the fingers and toes occurs in about 50 per cent of the patients although minor deformities of the nails occur more frequently and are overlooked in all but the advanced cases. Arthritis may occur in a number of cases. Hemoptysis is fairly frequent.

*Diagnosis*

Before the use of iodized oil as a contrast substance, the diagnosis of bronchiectasis was made by the history, physical findings, and occasionally by means of the x-ray. The x-ray was of more value

in those instances in which the bronchiectasis was marked on the right side, since on the left side the cardiac shadow tends to obscure the lung parenchyma and bronchial markings.

The use of iodized oil in bronchography and in the treatment of bronchiectasis has become widespread during the past few years. It is generally considered that the procedure is not attended by any serious consequences. Even iodism, which has been described by certain authors, has been overcome by careful technic. There has been some confusion as to how long the oil remains in the lung and how the lung disposes of it. Joseph A. Weinberg [7], describes two cases in which a lobectomy was performed after previous injections of iodized oil; in the specimens it was demonstrated that the oil had been taken up by all types of cells in the lungs, and not limited to the large, mononuclear phagocytes or related cells. In other words, he showed that the phenomenon of injection of the fat particles was due to the natural affinity of cells for fat and not only to phagocytosis. In one patient oil was found 83 days after injection into the bronchial tree.

The delineation of the tracheobronchial tree by means of iodized oil as a contrast medium was introduced by Sicard and Forestier a decade ago. This procedure, used at first only for diagnostic purposes, was soon recognized as having potential curative effect since many patients were noticeably improved after the diagnostic instillation of the oil. Beneficial effects were noted by such eminent observers as Pritchard, Whyte and Gordon, Lockwood, and others. The drawback to bronchoscopic instillation was solved by Ochsner who first described a "passive" technic in 1926. Since then this method has been given extensive application throughout the world in various clinics though not as much as its relative simplicity would seem to warrant.

I have used the direct or passive method of bronchography with Lipiodol as the contrast medium in a large number of cases by direct introduction into the larynx as outlined by the author in a previous article [8]. In June, 1935, J. Forrestier and L. A. Leroux [9] described a much more simple method of introducing the oil, that is by the perinasal technic. The author has used this method in a large series of patients both for diagnosis and therapeausis with no ill effect and very slight discomfort. The only difficulty that can arise is a marked obstruction of the patient's nasal passage which prevents the solution from trickling down into the posterior nares and so into the larynx, trachea and bronchi.

The instruments required are an ordinary glass syringe and a Eustachian Catheter. The anesthetic solution that we have been using is that recommended by Forestier consisting of

| | |
|---|---|
| Cocaine Hydrochloride | 2.00 gram |
| Potassium Sulphate | 0.60 gram |
| Phenol | 0.20 gram |
| Adrenalin chloride solution (1-1000) | 10.00 cc. |
| Aquae Menth Pip | 40.00 cc. |
| Aquae Dest. g.s. | 150.00 cc. |

The solution contains slightly more than one per cent of cocaine and we have never had a patient suffer any ill effects from its introduction. Of course if a patient is known to be hypersensitive to cocaine, one of the many non-narcotic anesthetics should be substituted.

1. Technic. The patient is seated directly in front of the operator as for an ordinary laryngoscopic or nasal examination. The nares and mouth are thoroughly washed with normal saline solution. The patient is instructed to grasp his tongue with gauze and pull it out as far as possible, in the meanwhile breathing very deeply. The reason for this is that when the tongue is pulled out of the mouth, the epiglottis and the whole lower larynx are raised and the upper orifice of the esophagus is closed. In this position the patient cannot swallow and any fluid that drops down into the pharynx must glide into the glottis. At the same time the anesthetic solution dropped into the nares will cause anesthesia of the posterior wall of the pharynx and eliminate cough reflex.

The anesthetic solution and oil should

be warmed before introduction, care being taken not to make it so hot as to burn or scald the tissues.

With the patient grasping the tongue, 5 cc. of anesthetic solution is dropped into one nostril, the patient meanwhile being cautioned to continue taking deep breaths. During the first injection the patient may cough and have some slight difficulty in breathing. But if he will continue holding his tongue and breathing deeply this reaction quickly subsides. The procedure is repeated every five minutes until 15 to 20 cc. of the solution are injected, depending on how sensitive the patient may be. After the anesthetic has been introduced, 20 cc. of the Lipiodol or iodized oil either 20 or 40 per cent strength is then introduced in the same manner as the anesthetic. The oil injection should preferably be made in the x-ray room so that films can be made at once, and the patient also fleuroscoped. Ten cc. should be introduced with the patient swinging to the right and the same to the left. If there is need to outline the upper bronchial tree, the patient can be placed in a Trendelenburg position and turned upside down. In this manner the entire bronchial tree from apex to base can be outlined.

In those cases in which dyspnea becomes somewhat severe, a subcutaneous injection of camphorated oil in ether will control it. The same procedure is carried out in treating patients, but only 7-10 cc. of the oil is introduced. For therapeautic purposes the procedure is repeated once a week.

In addition to introducing the oil for therapeutic purposes, it is wise to keep other measures in mind such as postural treatment. The foot of the bed is elevated at least 18 inches, whether the patient is in bed all day or just part of the day. In conjunction with this, the patient should be instructed to lie on the side of the bed so that the body will be at right angles with the lower extremities for a period of 10 minutes—three times a day.

Vaccine treatment has been used in some cases but it is not of distinct value.

The general building up of the individual by cod liver oil and nourishing foods of all kinds is of value.

The patient should be instructed in proper breathing exercises.

Bronchoscopic examination should be used in all cases to make sure that there is no obstruction such as a tumor or other foreign body.

If these measures are of no avail, surgery can be resorted to, the principles of which are drainage, compression, and extirpation; the procedures utilized are artificial pneumothorax, section or exersis of the phrenic nerve, thoracoplasty, pneumotomy with drainage of the larger collections of the pus, and excision or destruction of the involved lung tissue. Bendove & Gershwin [10] state that "Artificial Pneumothorax is effective only in cases of bronchiolectasis which yields even to low tension compression. If the lesion is limited to one lobe, a selective type of pneumothorax which entails little discomfort to the patient can be created. The therapeutic value of artificial pneumothorax is questionable in cases of cylindric or varicose bronchiectasis, as the rigid area will not yield to a collapse of a safe degree of tension. Still pneumothorax may change the lobe and its ectatic bronchi from a vertical to a horizontal position and thus promote better drainage. Artificial pneumothorax often finds its use as a preparatory procedure to radical thoracic operations."

Roles & Todd [11] say that, "Phrenic evulsions should be considered if artificial pneumothorax has not accomplished its purpose. At the same time results as reported have not been uniformly successful as the diaphragm becomes a functionless sheet preventing the action of this important respiratory organ in helping to clear out the bronchiectatic cavities. Again in case of further surgical procedures as lobectomy the evulsion would prevent re-expansion of the apex of the lung after removal of the diseased lobe."

*Comments and Discussion*

In reviewing a group of cases of the chronic persistent type, both children and

(Continued to page 30)

# Good Climate - an Asset in the Treatment of Tuberculosis

BY
ALFRED R. MASTEN, M.D.
Denver, Colorado

A Fox, being caught in a trap, was glad to compound for his neck by leaving his tail behind him; but upon coming abroad into the world he began to be so sensible of the disgrace such a defect would bring upon him that he almost wished he had died rather than come away without it. However, resolving to make the best of a bad matter, he called a meeting of the rest of the Foxes, and proposed that all should follow his example. "You have no notion," said he, "of the ease and comfort with which I now move about. I could never have believed it if I had not tried it myself; but really, when one comes to reason upon it, a tail is such an ugly, inconvenient, unnecessary appendage, that the only wonder is that, as Foxes, we could have put up with it so long. I propose, therefore, my worthy brethren, that you all profit by the experience that I am most willing to afford you, and that all Foxes from this day forward cut off their tails." Upon this one of the oldest stepped forward and said: "I rather think, my friend, that you would not have advised us to part with our tails if there were any chance of recovering your own."—AESOP.

It is natural to depreciate the thing one wants but does not have. There is, therefore, a possibility that many of the depreciating remarks made about climate as an aid in the treatment of tuberculosis have their foundation in this human frailty.

Today it is known, of course, that climate is not the most important factor in the treatment of tuberculosis. With proper medical care and supervision in regard to rest, exercise, good food, and fresh air, tuberculosis can be cured in most climates. In the terse summary of the great Dr. Osler, "Care without climate is better than climate without care." In spite of this fact, most leading authorities on tuberculosis agree that good climatic conditions have a favorable reaction on tuberculosis. Dr. Lawrason Brown, for example, believes that climate influences the progress of tuberculosis 10 to 15 per cent, the other 85 to 90 per cent being due to other factors. With many patients, however, a benefit of 10 per cent will turn the scales toward recovery—will enable them to gain health in place of invalidism. Whenever circumstances permit, therefore, a tuberculous person would do well to avail himself of the 10 per cent excess benefits afforded by a favorable climate.

There are many ways in which climate influences tuberculosis, for there are a number of factors which enter into the climate of any locality. Among the climatic factors which produce definite effects upon the body, the following are the most important:

## *Temperature*

The heat-regulating mechanism of the human body is so constructed that under normal conditions a constant body temperature is always maintained. Variations in atmospheric temperature either above or below normal demand the expenditure of energy in order to keep the body temperature at its normal level. When the surrounding air is much below the temperature of the body, the blood vessels of the skin are constricted, thus diminishing the amount of blood circulating in the cold areas of the body where heat is lost to the outside air. The sweat glands are inhibited, thus preventing perspiration and the normal loss of heat by evaporation. At the same time, the small skin muscles are stimulated to produce rapid contractions which we know as shivering, thereby producing heat by muscular contraction. Meanwhile there is a general increase in the body metabolism with oxidization of body materials (sugar,

fat and protein) to produce enough heat to counterbalance that which is lost to the atmosphere.

With an excess of heat there is an opposite reaction on the part of the body. The blood vessels in the skin are now relaxed, thus causing a flushing of the skin and enabling more blood to come to the surface to be cooled. The sweat glands are stimulated with a consequent production of perspiration and a resultant loss of heat by evaporation. The rate of respiration is increased in order to bring more cooling air into the lungs. This increase in respiration is particularly noticeable in animals which do not sweat, such as the dog and the goat. To supply the excess blood to the cooling areas of the body there is an increase in the heart and pulse rate.

In tuberculosis the body temperature is elevated by the disease and in consequence the body heat regulating mechanism is over-taxed even when the atmospheric conditions are ideal. When energy is also required to neutralize adverse atmospheric conditions, a certain amount of harm results, because a tuberculous person generally needs all his energy to overcome the disease. In civilized communities excess cold is neutralized to a large extent by artificial means, such as heated houses and warm clothes. Excess heat on the other hand is generally neutralized almost entirely by body processes alone, with of course, the expenditure of much of the person's energy. For this reason hot climates are particularly bad for a person with tuberculosis—a disease which of itself increases body metabolism and heat production. It is probably the excess heat which makes tuberculosis such a severe disease in tropical countries. In regions such as the Rocky Mountain area of the United States, tuberculosis seems to progress favorably, probably in part because of the variability of temperature every twenty-four hours. In this region, a temperature map shows that even on days when the noon temperature may be over a hundred, the night temperature is well below seventy, which assures restful sleep.

### *Humidity*

The degree of comfort experienced in any climate is not dependent entirely upon the temperature range because the effect of temperature is greatly influenced by the humidity of the air. As mentioned above, heat stimulates the sweat glands of the body and when the sweat evaporates, a marked loss of heat results. In a damp atmosphere, however, evaporation is retarded with a degree of retardation proportional to the amount of water vapor present in the air. With a wet-bulb temperature of 80° F. the body temperature soon begins to rise, the pulse and respiration become rapid, perspiration becomes profuse, followed shortly by heat exhaustion and death unless the conditions are remedied. In a dry atmosphere, however, as much as 260° F. can be endured for a considerable period without particular discomfort, because the cooling effect of heat evaporation is sufficient to keep the body temperature normal. It is the high humidity which accounts for the large number of deaths from heat stroke which occur every summer in our Eastern and Middle-Western states. It is frequently noted that many deaths occur in states such as New York and Illinois when the temperature is in the eighties while in states such as Colorado, Arizona, New Mexico and Western Texas the temperature may be above a hundred without producing even a case of heat exhaustion. The reason for this apparent paradox is that the atmosphere of these last named states is very dry, thereby enabling the body to make full use of its most efficient means of heat elimination, evaporation.

### *Air Movement*

The effects of both temperature and humidity are influenced by the amount of air movement present at any given time. When air is still, the body soon becomes encased in a capsule of hot, moist air which prevents the elimination of body heat. In hot weather, therefore, a breeze is of great importance in maintaining

proper heat elimination by both radiation and evaporation. In Colorado there is generally a breeze and frequently a wind blowing. This condition insures maximum effects from the body's heat-regulating mechanism. People coming from the East frequently complain of the wind in the Rocky Mountain States whereas they should praise it, for air movement not only aids in proper temperature control but also insures an abundance of clean fresh air.

*Sunshine*

There seems to be a direct relation between the amount of sunshine and the feeling of well-being and happiness. A bright, sunny day produces a definite feeling of well-being together with that sense of hope and confidence which is so necessary for good health. Dark, cloudy days produce a feeling of depression, increase bodily aches and pains, and intensify any existing tendency to pessimism. In a long-drawn-out disease such as tuberculosis where many discouraging setbacks are prone to occur, even under the best of circumstances, the mental stimulation given by sunshine is extremely valuable.

Besides its mental effects, sunshine has many physiological actions. Sunlight is a good general tonic; it strengthens the skin, aids the digestion, increases the haemoglobin content of the red blood cells and improves the musculature. Sunlight also increases the bactericidal powers of the blood by increasing the number of white blood cells and improving their power of digesting disease-producing germs. For this reason a person taking sunbaths usually acquires increased resistance to intercurrent infections, such as colds. In certain kinds of tuberculosis such as tuberculosis of the skin, glands, or bones, heliotherapy is the ideal treatment. For pulmonary tuberculosis direct sunlight is not indicated until the disease has reached a stationary or very chronic stage where a moderate amount of stimulation is required. However, all cases of tuberculosis are generally benefited by the slight stimulation obtained from daily breathing sun-saturated air.

When the benefits to be derived from sunshine are considered, it is apparent that a climate with a goodly amount of sunshine should be helpful to a person suffering from tuberculosis. A map of the United States showing the annual amounts of sunshine received in each locality shows that, in general, the Rocky Mountain States have more sunshine than any other part of the nation. At Denver, Colorado, for example, the sun is found to shine some part of 360 days out of each year with a total of from 60 to 70 per cent of all the sunshine possible.

*Altitude*

Altitude also has its effect upon physical well-being. As altitude increases there is a corresponding increase in the number of red blood cells, this having a tendency to diminish the anaemia so often found in tuberculous persons. The intensity of the sunlight is heightened as the elevation is increased; thus the effect to be derived from a given amount of sunshine varies with the altitude. Similar experiments performed at Denver (altitude 5,280 ft.) and Toronto (altitude 300 ft.) showed that in winter the effect of 15 minutes of sunshine at Denver was equal to that produced by two hours of sunshine at Toronto. This great difference is largely due to the difference in altitude although the degree of latitude is also a factor. High altitudes are accompanied by lighter and dryer as well as cleaner air. The lightness of the air at high elevations prevents the accumulation of moisture, dust, smoke and other impurities which at lower regions filter out a great deal of the sunlight, particularly the ultra-violet rays.

*Rainfall*

Rainfall is associated with fog and cloudiness and so gives effects just opposite to those of sunshine. The greater the rainfall, the greater the humidity and the ensuing interference with normal body heat elimination. The Rocky Moun-

## ELMHURST

A private sanatorium with all types of accommodations. Graduate nurses in constant attendance. Moderate rates.

MRS. F. C. GOTT, MGR.
ASHEVILLE, N. C.

## AMBLER HEIGHTS SANITARIUM

A modern sanitarium fully equipped for the treatment of pulmonary tuberculosis

*Descriptive literature upon request*

Edwina M. Richardson, R. N., Supt.
ASHEVILLE NORTH CAROLINA

## ZEPHYR HILL SANATORIUM

For the treatment of tuberculosis and chronic diseases of the chest.
Medical Staff:
C. H. Cocke, M.D.
S. L. Crow, M.D. J. W. Huston, M.D.
Mrs. W. I. Abernethy, R.N., Superintendent
ASHEVILLE NORTH CAROLINA

## ST. JOSEPH SANATORIUM

(Conducted by the Sisters of Mercy)

Fireproof, steam heat. All rooms have private sleeping porches with private or connecting baths.
Graduate nurses in attendance.
ASHEVILLE NORTH CAROLINA

## VIOLET HILL SANATORIUM

Owned and operated by Mrs. Florence Barth

Each room has a sleeping porch with southern exposure. Free automobile transportation to Town
ASHEVILLE Reasonable Rates NORTH CAROLINA

## PORTLAND OPEN AIR SANATORIUM

MILWAUKIE, OREGON

A thoroughly equipped institution for the modern medical and surgical treatment of tuberculosis. An especially constructed unit for thoracic surgery. The most recent advances in pneumolysis applied to those cases demanding this branch of intrathoracic surgery.

MODERATE RATES

Descriptive Booklet on Request

Medical Directors: Ralph C. Matson, M.D., and Marr Bisaillon, M.D.
1004 Stevens Building Portland, Oregon

## GRACE LUTHERAN SANATORIUM FOR TUBERCULOSIS

701 SOUTH ZARZAMORA STREET SAN ANTONIO, TEXAS

Admits patients irrespective of denomination or creed. Ideal all year climate....Excellent medical and nursing care.

"Radiographic, Fluoroscopic, and Pneumothorax service." New, distinctive, **Individual Bungalows....** highly modern; also Private Rooms with baths and sleeping porches....all equipped with radio.... Beautiful grounds....**Moderate Rates.**

For booklet and information address ..... PAUL F. HEIN, D.D., Pastor & Sup't.

## HOLY CROSS SANATORIUM (NON SECTARIAN) In the Health Zone of the Nation

A large, modern, privately owned, 250 bed Institution, comprising 500 acres, with Truck Garden, Poultry and Dairy Farms. Well balanced menus.

A "Home away from Home," with each Room and Ward adjoining a private, airy sleeping porch. Also private rooms with bath.

A beautiful, restful Health Resort, with separate Units personally supervised, and having every Medical aid and wholesome entertainment. X-ray and Clinical Laboratory work, Artificial Pneumothorax, Heliotherapy and Ultra Violet Ray. Competent medical and nursing staff. Radio, Microphone with ear-phone connections to each bed.

Located in the Health Zone of the nation with ideal year-round climate. Altitude 4,330 feet. Water 99.99 per cent pure. RATES $15.00 to $22.50 A WEEK

SISTERS OF THE HOLY CROSS, Supervisors » « HOLY CROSS, NEW MEXICO

tain states have a very low rainfall as compared with most of the other states of the Union. The rainfall at Denver, for example, is only 15 inches a year, while that of Chicago is 32.9 inches, New York City 43 inches, and St. Paul 41 inches. The average rainfall for the Rocky Mountain region taken as a whole is only 17.7 inches a year, which, of course, accounts for the dryness of the air.

From even a superficial study of climatic factors it would appear that they have considerable bearing upon the progress of such a disease as tuberculosis. As Dr. Shurley once said: "In the treatment of tuberculosis a cool, dry, high altitude with the greatest number of sunny days adds much to the percentage of recovery." This statement has recently been verified by a complicated statistical study made from the records of more than 150,000 deaths from tuberculosis among the white population in 42 states. When these states were compared it was found that by far the most favorable group consisted of those in the Rocky Mountain region. This most favorable group was followed by the West Central, the Pacific, the Northern and the Southern States in the order given. It was found that the five states comprising the Rocky Mountain Region had a death rate from tuberculosis of only 21.4 per hundred thousand population while the five states with the highest death rate had an average rate of 73.8 per hundred thousand. The climatic factors of the two regions were as follows:

| | Rocky Mountain States | High Death Rate States |
|---|---|---|
| Hours of sunshine | 8.2 | 6.9 |
| Altitude in feet | 4090.0 | 482.0 |
| Relative humidity | 59.2 | 75.4 |
| Rainfall (inches) | 17.7 | 43.5 |
| Daily temp. range | 24.2 | 18.5 |

The conclusion reached by the statisticians was that "The remarkably low tuberculosis death rate for the Rocky Mountain States seems to be mainly accounted for on the basis of uniquely favorable climatic conditions." From an unbiased study of all available evidence one must, therefore, conclude that a favorable climate is an asset in the treatment of tuberculosis.

*"Reading Time of Papers published in Diseases of The Chest — 5 to 15 minutes."*


**BROWNS MILLS – In The Pines**

NEW JERSEY

80 miles from New York City; 32 miles from Philadelphia; 3 miles from Camp Dix—Ideally located for patients with respiratory diseases.

**Manor Nursing Cottage**
Equipped with X-ray and Fluroscope; Pneumothorax.
**Lillian E. Hutchings, Owner**

**Browns Mills Nursing Cottage**
**Incorporated**
Excellent Medical and Affiliated Surgical Treatment for Tuberculous patients. Well Known For Home-Like Environment and Excellent Food.

**Sycamore Hall Sanatorium**
Equipped with every modern convenience.

**MARCUS W. NEWCOMB, M.D., Medical Director**

**SUNMOUNT SANATORIUM** SANTA FE NEW MEXICO

**FRANK E. MERA, Medical Director**

**Known for over a quarter of a century for its comfortable accommodations, its excellent table, its views and interesting surroundings and its climatic advantages.**

# SARANAC LAKE

## NEW YORK

**"In the heart of the Adirondack State Park"**

**Friends to the Tuberculous**

### COLLINS & LOW

**NURSING COTTAGE**

**7 Front Street**

Rooms with porches—modern conveniences—tray service—home cooking—reasonable rates.

### MC BEAN COTTAGE

**89 Park Avenue**

Located in the most desirable section of Saranac Lake—facilities for any type of accomodations.

**Mrs. C. M. McBean, Prop.**

### FALLON COTTAGE

**33 Franklin Avenue**

Located in a desirable section of Saranac Lake Modern accomodations at reasonable rates Homelike atmosphere.

**Mrs. Anna Fallon, Proprietor**

### NOYES COTTAGE

**16 Helen Street**

All rooms with sleeping porches, with and without private baths—good location—home-cooking Individual diets.

**Miss Cathryn A. Noyes, Prop.**

### FRANKLIN MANOR

**68 Franklin Avenue**

A private sanatorium for tuberculous patients requiring nursing care—excellent location—special attention to diets—rates upon request.

**M. Camilla Hayes Hudson, R. N., Supt.**

### TULLY COTTAGE

**164 Broadway**

A homelike cottage for the care of tuberculous patients—home cooking—pleasant environment—close in to town—moderate rates.

**Mrs. Frances Tully, Prop.**

### GONZALES COTTAGE

**80 Park Avenue**

Nursing and ambulatory suites — rooms and porches, with or without private baths—Spanish and American cooking.

**Mr. & Mrs. Alfredo Gonzalez, Mgrs.**

### WARSCHAUER COTTAGE

**64 Park Avenue**

A small private sanatorium, where a patient can secure individual care and excellent food—moderate rates.

**Mrs. Edna K. Warschauer, Mgr.**

### LYNCH COTTAGE

**88 Riverside Drive**

On the Lake—Facing the Mountains—Rooms and porches; some with private baths—nursing service—rates reasonable.

**Katherine C. Lynch, R. N., Prop.**

### WERLE COTTAGES

**110 Main Street**

Close to town—residential district—all modern conveniences—rooms with and without private baths—moderate rates.

**Aletta Werle, Prop.**

### HOEBLING NURSING COTTAGES

**26-28 Front Street**

Rooms and porches with and without private baths and running water—special diets when required—graduate nurses—rates upon application.

**Mr. and Mrs. H. Hoebling, Props.**

### SAGEMAN NURSING COTTAGE

**32 Park Avenue**

A comfortable home for the tuberculous—rooms with and without sleeping porches—graduate nurses in attendance at all times.

**Mrs. George C. Sageman, Prop.**

# Auscultatory Percussion in the Diagnosis of Chest Conditions

BY
WALTER H. WATTERSON, M.D.
La Grange, Illinois

AUSCULTATORY Percussion is a lost art in Physical diagnosis. It deserves, indeed, a much wider use than it was ever given. This opinion is formed after contact with recent graduates and with many practitioners during the past twenty years as instructor in chest diagnosis in the Army, U. S. P. H., U. S. Veterans Administration, and in various sanatoria. A prominent chest surgeon recently stated that he was about to throw away his stethoscope; perusal of ten volumes on diagnosis show auscultatory percussion mentioned in but four; a German translation of over eight hundred pages has no mention of this method of examination; the indexes of References in Practical Medical Series, a year-book review, for the past ten years has no reference to auscultatory persussion. A little book, The Phonendoscope, devotes all its pages to the subject; but infers that the phonendoscope is necessary to carry on this method or examination, which is not true.

Dr. G. P. Cammann, who devised the bin-aural stethoscope in 1854, soon thereafter made use of auscultatory percussion. His use was to outline organs, tumors or collections of fluids. At the autopsy he would outline these conditions, place needles about the organ or tumor, then prove his findings by proceeding with the autopsy.

While many attempts have been made to improve the bin-aural stethoscope of Cammonn, the present ordinary Ford scope is the only instrument necessary to auscultatory percussion.

The quality, pitch, intensity, and duration of sound as amplified by percussion has been much more clearly studied by the bin-aural instrument than by the Laennec mon-aural of fifty years previous.

The technic of this method of examination is simple. Place the bell of the scope over the solid or air-containing organ, fit the ear tips in the ear, hold the bell firmly with either hand, and with the middle finger of the other hand perform immediate percussion.

Begin with gentle percussion near the bell and proceed away from the bell when the distinct percussion note suddenly changes in intensity, or (as is often the case) in quality, pitch or duration.

As this change occurs, mark with skin pencil. To check on yourself, place the bell beyond the point of change in the note and percuss as before. The opposite changes in sound should be heard or you may check by beginning percussion beyond the skin mark approaching the bell. If the change again occurs at the same point, you may be certain you are at the border of the organ or condition being examined. By percussing in various directions from the bell of the scope and dotting the point of note change each time; then connecting the dots you have outlined the organ or condition.

With a little practice one may determine the following conditions with surprising accuracy: size, shape, and position of the heart; height and irregularities of the diaphragm; mediastinal changes including tumor; displacement; mediastinal adenitis including the d'Espine and Nies signs, as well as Grocco's sign in sero-fibrinous pleurisy. The various levels of an effusion with the differentiation of liver from fluid areas or from tumor, and if abscess or pneumonic areas from liver are easily determined.

This method of examination is of most use to the phthisiologist in the study of the condition of the lung: the extent of the disease may be outlined except where the disease is in small, disseminated areas. Contraction in a fibrosing lesion or extension of an exudative lesion may be outlined; outlining a cavity, especially if superficial, is very easy.

# Palmer Sanatorium

SPRINGFIELD
ILLINOIS

A Private Sanatorium of the Highest Class. Very moderate inclusive rates with no extra charges. Fully approved by the American College of Surgeons. Unusual refinements of service. New and modern buildings and equipment.

A CONVALESCENT SECTION for non-tuberculous convalescents.

Circulars on request: Dr. George Thomas Palmer, Medical Director.

# LAUREL BEACH SANATORIUM

SEATTLE (On the Salt Water Beach) WASHINGTON

A private sanatorium fully equipped for the modern treatment of Chest Diseases....X-Ray, Fluoroscope, Pneumothorax, Phrenectomy and Thoracoplasty....Special diets when required: private and semi-private rooms. Rates: From $25.00 per week up, including medical care.

FREDERICK SLYFIELD, M.D. JOHN E. NELSON, M.D. RAYMOND E. TENNANT, M.D.

# ST. LUKE'S HOME

SPECIALIZING IN THE ACTIVE TREATMENT OF TUBERCULOSIS

**Phoenix, Arizona, altitude 1100 feet—October to June.**

**Prescott, Arizona, altitude 5300 feet—June to October.**

*A highly favorable climatic arrangement.*

REV. B. R. COCKS.....Managing Director
E. W. PHILLIPS, M.D., F.A.C.P.....Medical Director

# SOUTHERN SIERRAS SANATORIUM

BANNING, CALIFORNIA

Location, near but not directly on the desert (altitude 2,400) combines best elements of desert and mountain climates....A sustained reputation for satisfaction, both among physicians and patients....Send your next patient here, and you may be assured of his receiving maximum benefit, and of his full gratitude.

C. E. ATKINSON, M.D.____MEDICAL DIRECTOR

# MARYKNOLL SANATORIUM

**MONROVIA** **(Maryknoll Sisters)** **CALIFORNIA**

A sanatorium for the treatment of tuberculosis and other diseases of the lungs. Located in the foothills of the Sierra Madre Mountains. Southern exposure. Accommodations are private, modern and comfortable. General care of patient is conducive to mental and physical well being.

**Sister Mary Edward, Superintendent** **E. W. Hayes, M.D., Medical Director**

# ST. VINCENT SANATORIUM

SANTA FE
NEW MEXICO

Information and Rates on Request

**TUBERCULOSIS IN ALL FORMS**
Robert O. Brown, M. D.
Medical Director

Conducted by SISTERS OF CHARITY

THIRTY-FIVE YEARS OF UNRIVALED SERVICE FOR THE SICK HAVE MADE

# St. Joseph Sanatorium and Hospital

**ALBUQUERQUE, NEW MEXICO**

*The Most Beloved and Famous Institution of the Southwest*

A 200 K.V.P. SHOCK-PROOF DEEP THERAPY MACHINE HAS RECENTLY BEEN INSTALLED

The study of the extent of collapse during artificial pneumothorax treatment is most satisfactory, and since more and more treatments are given in the home, we have a good substitute for the x-ray. Even adhesions and their effect on the treatment may be fairly well estimated.

Many of the phenomena such as amphoric resonance, cracked-pot sound, Wintrich's change of sound, Gerhardt's and Biermer's phenomena can be brought out to advantage by this method.

It has been my custom to graph as well as write a report of my findings on examination and then study the x-ray. If there are differences, re-examination is made.

Of course one should not neglect other methods of examination. A carefully taken history is invaluable, gives data which lead to further study and examination and elimínates many a stumbling-block in the diagnosis. A clinical study furnishes a working basis for both diagnosis and treatment. The physical examination, of which auscultatory percussion should be a part, gives a mental picture of the extent, results of the disease to date, and factors which must be weighed with reference to treatment, prognosis, and future comparative study. Laboratory study is so essential to the bacterial diagnosis that no diagnostician would abstain from it while blood and other laboratory aids are graphic sign posts in following the course of a disease.

The x-ray is a most valuable aid in the diagnosis and study of diseases of the chest; but when it is used to the exclusion of other methods of examination, as above mentioned, most of the advantages of the other forms of examination are lost to the examiner.

The patient expects of you as his physician acumen and a satisfactory knowlege of the disease in question. If you are a specialist, the patient expects more of you.

By the use of auscultatory percussion you will be giving a super-service which will be recognized at once.


# IN THE WHISPERING PINES OF GEORGIA

## *Athen's Tuberculosis Hospital*

## FAIR HAVEN SANATORIUM

**36 Beds**—under the direction of permanent medical staff and a full corps of nurses.

AMPLE PROVISION FOR:

**X-RAY & FLUOROSCOPIC EXAMINATION**

**MAJOR SURGICAL WORK**

**PNEUMOTHORAX**

**Mrs. E. Hood, Superintendent** **Dr. C. O. Middlebrooks, Medical Director**

# *The* Pottenger Sanatorium *and* Clinic

Write for particulars
THE POTTENGER SANATORIUM AND CLINIC
MONROVIA, CALIFORNIA

For the diagnosis and treatment of diseases of the lungs and pleura; asthma and other allergic diseases; asthenics and others who require rest and supervised medical care . . . . An ideal all-year location. The grounds surrounding the Sanatorium are beautifully parked and add much to the contentment and happiness of patients.

Close medical supervision. Rates reasonable.

F. M. Pottenger, M.D. ..... Medical Director
J. E. Pottenger, M.D. ..... Asst. Medical Director and Chief of Laboratory
Leroy T. Petersen, M.D. ..... Asst. Physician and Roentgenologist
F. M. Pottenger, Jr., M.D. ..... Asst. Physician

# ROCKY GLEN SANATORIUM

McCONNELSVILLE, OHIO

*For the Medical and Surgical Treatment of Tuberculosis*

DR. LOUIS MARK, Medical Director
677 N. High St., Columbus, O.

H. A. PHILLIPS, Superintendent
DR. D. G. RALSTON, Resident Med. Director
DR. A. A. TOMBAUGH, Resident Physician

Graduate Nurses

Where the science of treatment is first

Beautiful Surroundings — Reasonable Rates

# BARFIELD SANATORIUM

*In the Delightful Sunshine of Tucson, Arizona*

*EXCELLENT ACCOMMODATIONS*

KARL BARFIELD
*Managing Owner*

SAMUEL H. WATSON, M.D.
*Medical Director*

# METHODIST SANATORIUM

**ALBUQUERQUE, NEW MEXICO**

A modern sanatorium for the Tuberculous — Four large modern well-equipped buildings and fifty cottages surrounded by beautiful lawns and trees — Open to all physicians — Rates $50.00 to $75.00 per month — medical care extra.

**MRS. MINNIE G. GORRELL**, Superintendent

# VON ORMY COTTAGE SANATORIUM

VON ORMY, TEXAS

FRANK C. COOL.....President
R. G. McCORKLE, M.D., Med. Dir.
W. R. GASTON.....Manager

An institution designed for the proper treatment of tuberculosis patients at moderate rates. Beautifully located on the Medina River near San Antonio, Texas. Splendid all year 'round climate. Our own dairy and egg supply. Artificial pneumothorax used where indicated. Hopeless last stage cases not admitted. Weekly rates $15.00, $17.50, and $22.50. For booklet please write the manager.

BRONCHIECTASIS—(Continued from page 19).

adults, it was amazing to find the large percentage of cases with conditions ranging from a greater or less of a degree of dilated bronchi to the most severe form of bronchiectasis. It was found that except in those cases in which there was far advanced involvement there was an improvement after repeated injections of the oil by the intra-nasal method. In the group of cases suffering from subacute bronchitis there was improvement and cure was established after two or three treatments.

The author is not attempting to offer the procedure as a panacea, but rather as an adjunct to treatment of the large group of unfortunates who cough despite the fact that all the forms of treatment at our disposal have been taken advantion, the introduction of the oil is of no value; various surgical measures must be resorted to.

### *Conclusions*

1. Bronchography is a simple procedure as outlined by the above method.
2. Solutions of iodized oil are of distinct value in the treatment of many nontuberculous conditions such as pulmonary suppuration, subacute bronchitis and asthma.
3. Close cooperation is urged between the rhinolaryngologist and the internist.
4. In those cases in which there is extensive bronchial and pulmonary destruc-

### *Bibliography*

(1) McCrae and Funk E. H., Journal American Medical Association—1916-67—1060.
(2) Eli H. Rubin and Harry S. Newman, Upper Lobe Bronchiectasis, American Journal of the Medical Sciences, November 1933, No. 5, Vol. CLXXXVI, P. 650.
(3) W. P. Warner, Bronchiectasis: Aetiology. Diagnosis and Treatment, The Canadian Medical Association Journal, XXVII, 583-593, 1932.
(4) Edward Archibald, A Consideration of the Danger of Lobectomy in the Journal of Thoracic Surgery—April 1933, P. 335.
(5) Smith, D. T., Relation of Vincent's Angina to Fuso spirochetal Disease of the Lungs, J. A. M. A. 94:23 (Jan. 4) 1930.
(6) John A. Kolmer, Bronchial Disinfection & Immunization, Archives of Internal Medicine—March 1933—Vol. 51, pp. 346-366.
(7) Joseph A. Weinberg, Iodized Oil in Bronchiectasis, Archives of Surgery, September 1933, Vol. 27, pp. 545-564.
(8) Treatment of Pulmonary Infections, by Nathan Blumberg and Maurice S. Jacobs, Pennsylvania Medical Journal, October 1933.
(9) Forrestier J. and Lerous L. A., A Simplified Method of Bronchography, Radiology 24:6, 743, 748, June 1935.
(10) Raphael A. Bendove & Benjamin S. Gershwin, Morpholic Varieties of Bronchiectasis in the Adult, Archives of Internal Medicine, July 1934, Vol. 54, pp. 131, 144.
(11) Frances C. Roles & Geoffrey S. Todd, Bronchiectasis—Diagnosis & Prognosis in Relation to Treatment, The British Medical Journal, Oct. 7, 1933, pp. 639-643.

SYMPTOMS OF EARLY TUBERCULOSIS—(Continued from page 14).

mentioned symptoms are highly suggestive of early tuberculosis though not diagnostic. Other diseases can produce these same symptoms, and only a provisional diagnosis should be made from them. The final diagnosis should be made only after a correlation of the symptoms, careful examinations, laboratory work, usually some form of x-ray study, and, if necessary, a period of observation.

Southwestern Presbyterian Sanatorium

ALBUQUERQUE, NEW MEXICO

A well-equipped Sanatorium in the Heart of the Well Country.

*Write For Information and Rates.*